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An Inaugural Dissertation on some of the Causes of Malignant Epidemics for the Degree of Doctor of Medicine at the University of Pennsylvania

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by
Edward L. Brown
of
Nova Scotia.

a very excellent Dissertation by Spooy

Felix qui potuit rerum cognoscere causas. Virg.

Philadelphia Feby 4th
1829

I am aware that the title I have selected for my dissertation is one of a very vague and indefinite acceptation, as commonly applied by medical writers, and that it may for this reason be considered inaccurate and exceptionable. Malignancy or malignity is in fact a term of so loose and general an application, that if it have any fixed nosological signification, it must necessarily be a very wide and comprehensive one. Although it occurs in almost every page of all the numerous treatises on fevers and febrile diseases, and seems to convey, if not a distinct, at least a general idea of the authors meaning; it will be found exceedingly difficult if not impossible to give it any thing like a precise or limited definition. The reason of this ambiguity seems to be, that writers have abused

the term by employing it too frequently and too promiscuously, and I may venture to add by employing not unfrequently to express a something of which they themselves had not the clearest conceptions, and of which they were willing to conceal their ignorance.

But the mere consideration of names could not and I presume ought not deter me from writing on a subject, which, from circumstances I shall hereafter take occasion to explain, made a considerable impression on my mind, and has consequently occupied my attention since the commencement of my studies more particularly than any other. Such indeed is the present state of medical nomenclature, that it is doubtful whether an appellation more appropriate or more generally employed to designate that peculiar state

of the system which is to be the subject of this essay could possibly be adopted. Among the endless variety of synonymes in common use to express this condition, are typhoid, putrid, low, malignant, pernicious, congestive petechial, hemorrhagic, ataxic, atonic, adynamic, asthenic, algid, icteroid, gangrenous pestilential, hospital, jail &c as applied to fevers or particular stages of them; and many of them also to certain stages of various other diseases, as for example, Pneumonia Typhodes, Cynanche and Scarlatina maligna, Erysipelas gangrenosa &c. In fact there is scarcely a disease in nosology, however inflammatory in its commencement, which from the influence of cause, temperament, locality or treatment, may not be totally changed in its character and degenerate into a type usually denominated by some

one of the above appellations. There are besides these certain terms of a still more general and extensive application, some of which being very trite it may not be improper to notice. By Brown, whose greatest fault was too wide a generalisation, this state of the system was termed Asthenia or debility, which he divided into two classes, viz. direct Asthenia or that produced by a deficiency of the normal stimuli and excessive excitability; and indirect, which was owing to superexcitation and deficient excitability. Malignant diseases for the most part he ranked in the latter class; although he erroneously placed Typhus in the former. By Fordyce it was called depression of strength, by others prostration of the vital powers, atony, debility weakness, sedation, laxity, putrescency, sinking &c.

It would be superfluous and foreign to my purpose to enter into a discussion of the derivation, signification, and merits of these several appellations; especially since there is not one I presume, against which there might not justly be raised many serious and weighty objections. It is indeed a fact sincerely to be regretted, that names so puzzling to the student and so burdensome to his memory, bearing, as they do, in their very sound a convincing proof of the ignorance of the times in which they were adopted, should continue to be tolerated, and even clung to with a kind of religious fondness, in the present enlightened era of medical science. Perhaps no two sciences have undergone so great a revolution within a few years as those of Chemistry and Medicine and yet how different is the present state

of their respective nomenclatures; while the former by rejecting all its antiquated superfluities and substituting terms which convey to the learner a brief definition of the substance or property they are intended to represent, has arrived at the highest degree of perfection; Medicine is groaning under the incumbrance of an obsolete and senseless farrago totally unworthy of the present elevated & philosophical rank of the profession - This doating and superstitious veneration for the blunders of antiquity cannot be of long duration, a happy change the constant result of progressive improvement is to be anticipated, a change calculated to facilitate the progress of the student contribute to the utility of the science and advance its reputation and that of its teachers and

practitioners in the eyes of the world —

The word malignant is derived from the Latin malignus and this last from malus bad, and in common language is applied to any thing of a malicious or inauspicious nature. In medicine it is generally made use of to signify a tendency of the solids and fluids of organic bodies to destruction and decomposition or in other words to become subject to the laws of common chemical affinity; and is applied promiscuously to the latter or what is called the sinking stages of fevers as well as most inflammatory diseases — Medical writers of all ages have concurred in ascribing to a certain unknown power connected with organic life, the salutary property of repelling the operations of morbific agents and of restoring injured and disorganised parts to their former healthy

condition – The name assigned to this wonderful power varies according to the different authors who have made it the basis of their respective hypotheses, thus it is the φυσις or Natura of Hippocrates, the anima medica of Stahl, the Archæus of Van Helmont & the vis medicatrix of Cullen – The nature and modus operandi of this power are entirely unknown, but its effects are unquestionable, of which one of the most common is inflammation, which with all its numerous modifications and terminations is considered a healthy process. But when the efforts of nature exhausted by the continuance of morbific agents or overwhelmed by their intensity are no longer adequate to resist these aggressions, a series of phenomena supervenes characterised by all the well-

well known marks of approaching dissolution; and the system, which had been previously subject to the laws of organic or vital chemistry, begins to feel the influence of those which govern common inorganic matter — To these phenomena the general appellation of malignity has been attached, by the common consent of most writers who have touched on this subject — There is indeed nothing in it of a specific or unintelligible nature, it is the uniform pathological effects of certain noxious agents acting on the living system and modified by the variety and intensity of those ~~causes~~ agents, the particular tissues on which their action is developed and the temperament of the patient who happens to fall under their influence — Now what has been said some conception may perhaps be formed of the

meaning and latitude I would attach to the term I have chosen for my titlepage. I am sensible of the lameness and imperfection of my attempts to describe it, but find myself incapable of offering anything more definite or satisfactory —

The precise nature or proximate cause of this condition has long been and still continues to be a matter of dispute — It seems to depend on the vitiation of those two great functions of the animal œconomy, which are immediately essential to the preservation of existence, viz the nervous and sanguineous systems. The condition of the former is evinced by the prostration of the locomotive apparatus and that of expression, the relaxation of the sphincters, the depraved state of the senses & intellectual faculties &c — That of the latter

by the weak and almost imperceptible pulse, laborious respiration, defective secretion, passive hemorrhagy &c – The disturbance of these two great functions must necessarily involve all others which are either closely connected with or depend immediately on them; hence the depraved state of digestion, nutrition, calorification, secretion, absorption &c – The question, which of these systems the nervous or circulatory is primarily affected and which more immediately gives rise to febrile diseases has occupied the schools of medicine from its earliest infancy down to the present day and has given rise to the two famous theories of pathology, humoralism or that of the fluids and solidism or that of the solids – The ancient doctrine of the dissolution of the blood and putrefac-

tion

tion of the fluids has long since been almost entirely neglected and in fact is now nearly exploded. This is the result of numerous experiments performed on different animals by different physiologists, among which those instituted by Dr. A. Seybert a graduate of this college and published in his inaugural thesis seem to have been very satisfactory and conclusive on this point. For many years the subject has attracted but little attention, until very lately the experiments of the celebrated Magendie, M. Collard de Martigny and others would seem to favor the reestablishment of this old & neglected theory. According to these experiments, it would appear that injections of putrid matters into the veins of animals were followed by all the phenomena usually exhibited in putrid fevers. And it is in this man

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manner, by the absorption of putrescent matter that Magendie accounts for the fatal results arising from wounds received in dissection — the monstrous and glaring absurdities of the humoral pathology have in the opinion of many excellent pathologists of the present day been the cause of running into error on the opposite extreme, and notwithstanding the general prevalence of the opposite doctrine, humoralism under certain modifications and amendments is daily gaining ground — By the researches of organic chemistry substances taken into the stomach, or applied to an absorbent surface have been detected in the blood and secretions, and even in the solids as the hair in their essential and formal state — and it is well known that the urine may be rendered acid or alkaline and again

neutralized by the exhibition of medicines possessing these qualities. Medicines injected into the blood vessels produce effects similar to those resulting from their application to the stomach and alimentary canal, it may then I think be fairly inferred that morbid agents may in like manner be absorbed, carried into the circulation & produce effects similar to those developed from their application to the solids. Another argument is the vitiated condition of the blood in malignant diseases, for although it may never exist in the vessels in a dissolved or putrefactive state, it cannot be denied that it coagulates much slower than ordinary in most of these cases. But whether this condition of the vital fluid be the true and original proximate cause of malignant phenomena or only an effect of a

of a preceding depravation of the solids / a question, which is perhaps not yet satisfactorily solved / it must be conceded, that such a condition of the fluids existing whether primary or secondary must reciprocally affect the solids, which are formed and receive their stimulus of action from them, and in this way materially resist the efforts of nature for their reinstatement to a healthy condition.

I have been led to offer the above remarks from a conviction that the influence of the fluids in Pathology has been undeservedly overlooked and neglected ——. Many of the phenomena of malignant diseases may be ascribed to a defective elaboration of arterial blood or what is called Hematosis resulting from the depraved condition of the organs by which this function is performed; and also to the highly congested state of the capillaries

of one or more of the internal organs in consequence of the preceding nervous irritation; by which means large quantities of blood being as it were isolated and detracted from the circulating mass, a deficiency of that fluid so necessary to the performance of all the functions and particularly the secretion of the nervous influence, is the direct result. The fatal effects of extensive general blood-letting so often experienced in these cases may on this hypothesis be very plausibly and rationally accounted for — According to the nervous pathology of which Hoffman and Cullen may be considered the founders, malignant diseases were attributed to the direct sedative agency of certain remote causes, as human and marsh effluvia, cold &c on the sensorium commune, diminishing the secretion of nervous energy and thereby inducing

a state of general debility, by the consequent depression of all the other vital functions. Order that this effect should take place according to the Cullenian school, it is necessary that these remote causes be so powerful, or that the vital resistance be so weak, or that both these circumstances be combined in such a manner that re action is prevented from taking place.

Having made these preliminary observations, I now proceed to what is more particularly the subject of this essay, viz the remote causes of Malignancy. Etiology is divided into remote and proximate, of which the latter has already been cursorily noticed; the subsequent observations will consequently be confined exclusively to the former. Remote causes are subdivided into predisposing and exciting. Thus a person of a lymphatic temperament

-ment is said to be predisposed to Phthisis but this predisposition might remain inert for an indefinite term without such a termination, were it not called into action by the application of some exciting cause, as Cold &c - This nice subdivision is doubtless not without utility, but the line of distinction appears to be often obscure and equivocal; at least I must confess my ignorance of any certain discriminating characters & hope to be pardoned if I sometimes confound them -

The modus operandi of causes has long been the subject of much ingenious & animated discussion - The point most controverted is whether there exist any physical agents morbid or sanative which when applied to the living tissue are capable of producing directly debilitating effects.

Cullen and his followers supported this dogma. He taught that animal and vegetable miasms, cold, the depressing passions & some medicines called sedatives possessed an immediate power of depressing the nervous energy. The opposite doctrine maintains that all natural substances are irritants, that all debility is indirect, & that the debility induced in one organ is counterbalanced invariably by a corresponding exaltation in another. However ingenious and plausible this may appear, there are cases on record especially of plague, cholera, and what are called algid fevers in which from the commencement to the termination no symptoms of exalted action were discoverable, and I am persuaded I have witnessed cases of this character. There are also certain medicines such as Prussic

acid, digitalis, tartar emetic and other saline preparations, whose exhibition is so rapidly followed by sedative effects, that it is problematical whether they are capable of producing any other. There can likewise be little doubt respecting the operation of bola, & the depressing passions —

Contagion is a word of ominous import and has long been the favorite hobby of the most intelligent of the profession. As its nature and modus operandi are inexplicable it affords a very convenient subterfuge to avoid further investigation — Except in Variola and one or two others of the Exanthemata it is now entirely rejected by the best pathologists. There are however some facts related by Pringle, Blane, Haygarth &c / such as the army of Sir John Moore and the court infected by some animals

nals undergoing trial / which are not easily explained on any other hypothesis. The most rational and philosophical method of reconciling these statements is by supposing the air of ships, jails, hospitals &c to be rendered impure by being too frequently inhaled for the want of a free ventilation, and that it is capable also of adhering to the clothes of persons so confined and thus convey the disease by fomites. On this head the arguments of Professor Chapman on typhus in his lectures are very conclusive and satisfactory – Having thus cursorily noticed contagion, I shall pass to the consideration of those causes of malignant diseases, which having come more particularly under my personal observation will occupy a greater share of attention. These may be comprised under three head, viz, vegetable miasmata. Heat & drought.

and depression of the nervous system by moral affections. The miasmatic doctrine has of late engrossed considerable attention. Not a little scepticism with regard to its existence has been excited, and some well written essays on the subject have lately appeared in the medical journals from different parts of the world. In this city a very learned and ingenious paper to this effect has been published by Dr. Bell in the Journal of Medical Sciences in which the existence of miasmata is called in question, and the production of what are commonly called miasmatic diseases deduced from very different sources. These arguments are supported by a great number of facts illustrative of his hypothesis. In Italy also this subject seems to have attracted attention: a paper from Dr. Foleke of Rome was lately

read by Dr. Bell at the Medical Society, in which he endeavors to prove that the cause of intermittent and other fevers is to be found in what he calls a deficiency of electromagnetism. A very instructive and animated discussion followed the reading of the paper, the arguments on both sides were cogent, and it was difficult to determine which merited the preference — It appears indeed a little surprising that the most frequent and destructive maladies which "flesh is heir to" should be ascribed to the agency of causes, which are intangible imperceptible, and can exist only in the imagination; which elude and must ever with our present means of analysis continue to elude our most diligent investigations.

But however unphilosophical the admission of such an agent may appear, the doctrine of miasmata must remain unshaken until

a more rational one be discovered to take its place and the facts I am about to relate will I presume have a tendency rather to support its validity — Every body who has heard of the Bay of Fundy, knows that the tide at the full and change of the moon rises to the almost incredible height of 50 a 60 feet. This bay after a course of some hundreds of miles becomes contracted into a strait of about a mile in breadth, and afterwards becomes considerably expanded forming what is called the Basin of Minas which is about 80 miles in length and 20 in breadth — The country about the shores of this basin constitutes the most fertile and flourishing part of the province of Nova Scotia, and this circumstance is owing to the great extent of marshes situated between the shores of the basin and the uplands and likewise on the shores of the numerous rivers which

empty into the basin – These marshes are composed entirely of alluvial soil without a trace of siliceous earth for the depth of many feet – They are covered by the salt water only in the times of the highest tides and then only to the depth of 5 or 6 feet – The only kind of vegetable which appears on their surface is a peculiar kind of sedge called salt grass, which grows very thick to the height of 6 to 18 inches and is mown by the farmers and preserved for their cattle – The original settlers of this country, the French, had dyked, that is, enclosed from the sea a considerable portion of these marshes, which proved a most valuable acquisition, requiring little culture and abounding in rich and copious harvests – Since the conquest and cession of the country to the British many accessions have been made to the ancient dykes so that at present the sea is excluded from

an extent of many thousand acres. In the autumn of 1824 an enclosure of 7 or 800 acres was completed; in the spring of 1825 all the vegetable matters divested of their semimonthly supply of salt water decayed and on the approach of the summer months were speedily decomposed; whilst incredible quantities of animalcula and insects sprung to life and as rapidly perished.

About the middle of July the effects of this decomposition began to be displayed among the inhabitants of the district in the vicinity of this recent dyke. This section of the country had always been proverbially healthy insomuch that it was said to starve its physicians. The uplands on which the inhabitants dwell are elevated from 1 to 200 feet above the level of the sea and the atmosphere is generally filled with the salt vapor arising from the shores which the reflux of the tide leaves uncovered in some places

for many miles, or with the fragrance of the luxuriant vegetation from the intervening dyked marshes. In the short space of six weeks, viz from the middle of July to the latter end of August of about 500 inhabitants more than one hundred in the immediate vicinity of the decaying vegetables fell victims to a most deadly and malignant epidemic. Scarce a family escaped and many lost 4 or 5 from their number. I was present in many of these cases and although then uninitiated in the study of medicine, so uniform and unequivocal were the symptoms, that a very accurate judgment might be formed by the most indifferent observer. The temperament as usual in healthy country places was almost universally sanguine, the habit full and plethoric. But so great was the predisposition of the system to disease that the application of the most trifling causes was suf

ficient to develope the most alarming symptoms. These were slightly varied during the first 24 hours in different subjects according to the tissues which received the primary impression, but after the sympathies of the general system became involved, they were strikingly uniform; and prostration succeeded so rapidly that the signs of reaction were often scarcely discernible. Among the first was the case of a young merchant, who having slightly scratched his foot with a nail experienced a violent œdema of the whole limb, to which sloughing succeeded and he narrowly escaped a fatal issue. His nurse was attacked with malignant erysipelas of the face, great prostration of strength, low delirium &c, but fortunately for her, her residence was at a considerable distance in the country whither she was removed, and after a long illness partially recovered. A half pay maja-

in superintending his hay harvest accidental-
ly pricked his finger with a thorn from a this-
tle in a few hours he experienced severe pain
in the part extending up to the shoulder &
clavicle, in the course of the night after the
accident, œdema took place and spread
rapidly up the arm to the neck and face, in
forty eight hours gangrene followed and speed-
ily terminated his existence - A robust farmer
had the cuticle of the face slightly removed by
the scratch of a cat. I saw him about 48
hours afterwards when not a feature of his
face could be distinguished, they were all
blended in one confused mass -

Globus informis et confuso pondere truncus.

His vital energies were at the lowest ebb
and he expired in a few hours. His wife
was taken ill and died immediately after,
her symptoms except the œdema were precisely

similar. Between 30 and 40 children, sometimes 4 or 5 in one family from what under ordinary circumstances would be considered a slight cold, some experienced the fatal effects of Cynanche Maligna in its most deadly form. In two cases a perfect membrane was hawked up showing evidently the existence of inflammation but without the slightest benefit to the patients.

I could detail many similar cases, which come under my observation, and which I perfectly recollect, were they necessary to support any particular hypothesis; but the only points I wish to establish from the above cases, are that the cause whatever it might have been, was a common one, and that its influence did not extend beyond the neighbourhood of the recent dyke. The first of these positions I think is fairly inferible from the similarity of effects, for however varied the first symptoms might be

on account of the peculiar nature of the exciting cause, or the tissue or organ primarily affected, they were universally succeeded by that train of symptoms which so strikingly characterises the march of all malignant diseases and which it would be superfluous to enumerate, as they must be present in the mind of every one who has witnessed a fatal case of Typhus or Yellow fever. That the cause was not exclusively heat, moisture, vicissitudes, winds or the general vitiation of the atmosphere is deducible from the limitation of the disease to one particular spot, from the general prevalence of health in the country around, and in particular from the immunity of 2 or 3 families, one of which was very further, which although in the immediate proximity of the marsh happened to occupy very elevated situations, placing them in all probability above the level of the miasmatic taint. Notwithstanding

what has been adduced in favor of miasmata an objection of very considerable weight must not be concealed, viz that in former instances of similar and even much more extensive enclosures of marsh, no such consequences as far as I can learn were exhibited; that, next preceding the one in question, in which more than 1000 acres were included, was finished in 1813 & 14 but was marked as I ascertained from enquiry by no such fatal consequences. This circumstance can only be attributed to the temperature and peculiar state of the weather during the prevalence of this malady; and this brings me to the second general head viz. Heat and drought — The agency of Heat in the production of pestilential and malignant epidemics, has I believe never been seriously called in question — Their association as cause and effect must be ever present to the mind of the classical reader who has turned the pages of Homer

Thucydides, Lucretius and Tacitus – I shall omit making any general observations on the modus operandi of Heat as a malific agent and confine myself exclusively to matters of fact, convinced that facts are much more important and valuable than Theories and will consequently prove more acceptable. – During the prevalence of the above epidemic and about a fortnight previous to its accession, the uniformity & intensity of the temperature were very remarkable – The thermometer in the shade during the day ranged from 75° to 95° Fahr. This is not unusual during the months of July & August for a short time – the only thing remarkable was its uniform & uninterrupted continuance. – Day followed after day and week after week, without any perceptible ~~[illegible]~~ change in the temperature or other meteorological phenomena – The table or register for one day with very slight altera-

-tions would have been applicable to sixty in succession - The atmosphere was loaded with smoke from the continual fires of the back settlers in clearing their lands, to such a degree that objects were not visible at the distance of a few yards - This is, I presume a sufficient proof of the levity of the atmosphere, though to what degree cannot be precisely determined as no barometrical register was kept in the neighborhood - The sun exhibited a red & fiery appearance throughout the day but more especially in the morning and evening, which was doubtless owing to the interposition of the dense smoke; and to this cause may also be attributed the mildness of his rays for I recollect perfectly, it was not painful to the eyes to gaze at him steadily for some minutes; There was scarcely a breath of wind during the whole time which, in case it had blown would speedily have dissipated the smoke - Another very remarka-
-ble

the circumstance was the absence of dew, not a drop was deposited, whether this was owing to the dryness of the atmosphere or perhaps more probably to the radiating power of the smoke preventing the deposition of dew in the same manner as the clouds do, or whether to both these causes jointly is not for me to decide — The drought during the whole period was excessive, for 8 or 9 weeks there was not a refreshing shower, not even a cloud was seen for an instant to obscure the scorching rays of the sun — The fires kindled in the forests spread far and wide desolating and despoiling thousands of acres of their wood and not sparing the villages & towns which chance placed in their way — It was during this period that the town of Miramichi in New Brunswick was consumed in which more than 100 of the inhabitants perished — This state of things continued until about the

last of August or first of September, when the occurrence of a violent thunder storm entirely changed the face of affairs — The air became cool and clear, the sun resumed his natural appearance and a speedy stop was put to the progress of the disease — Were not the limits of this essay already extended as far as the rules of propriety will justify — I would proceed to offer some remarks on the effects of what are usually termed the depressing passions viz. Fear, Grief and Melancholy — Our knowledge with regard to these as well as of every thing connected with the nervous system is necessarily very limited: and all attempts to describe their nature is little better than speculation — Their seat in the human system is even disputed. Bichat locates them in the stomach and solar plexus; most physiologists however concur in ascribing their origin to the brain — Ample evidences of their

effects abound in the history of medicine, one of the most remarkable perhaps is the susceptibility of an army to pestilential diseases after a defeat. I might here attempt to shew how the phenomena of Malignant diseases are modified by the different tissues and diathesis, would the narrow limits of an Inaugural Thesis admit of it; I shall only remark that the mucous coat of the stomach and intestines from their numerous sympathetic connections with all the vital organs and especially the brain is most prone to give rise these phenomena, & that subjects of a lax fibre & those in whom the fluids predominate as well as those previously debilitated by diseases are more liable to these forms than others.

It will be seen that I attribute the epidemic which I have attempted to describe to the joint influence of miasmata, and

heat – whether my inferences are correct or not the Faculty must judge; I can only say that the statement as far as it goes, has been given with the strictest adherence to truth and candour. It may be expected that I shou offer some observations on the treatment instituted in these cases; but as I could not then be a competent judge of it, I shall pass it by with merely remarking, that very little was done, and that in a few of the first cases when inflammatory symptoms prevailed to a slight degree, venesection was resorted to, with the result of increasing the prostration of strength and inducing gangrene in the arm, commencing at the orifice whence the blood was drawn – No post mortem examinations were allowed –

The melancholy fate of my countrymen and companions first excited me to embark

in the study of medicine, which I commenced in the ensuing Autumn; and my inquiries have ever since been directed to this point more particularly than any other — Although I have read several authors on the subject such as Fordyce, Pringle, Alyhorn, Lind, Jackson, Hayfarth &c; I have avoided quotations, regarding a candid statement of facts to which I was an eye witness preferable to the crude & premature speculations of a novice in the science —

E – F

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